

PERCA LINEATA AND *P. VITTATA* ESTABLISHED AS VALID SPECIES OF
PLECTORHINCHUS (PERCIFORMES: HAEMULIDAE)

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The Linnaean fishes *Perca lineata* and *P. vittata* are established as valid species of the haemulid genus *Plectorhinchus*. *Plectorhinchus goldmanni* (Bleeker) is a junior synonym of *P. lineatus*, and *P. orientalis* (Bloeh) is a junior synonym of *P. vittatus*. Meristic data are tabulated to provide an additional basis for separating four other striped species of *Plectorhinchus* that at some stage resemble either *P. lineatus* or *P. vittatus*. □ Linnaeus, fishes, haemulidae, *Plectorhinchus*, *goldmanni*, *lineatus*, *orientalis*, *vittatus*.

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Many fishes of the haemulid genus *Plectorhinchus* undergo remarkable changes in colouration with growth. There has been considerable confusion, particularly in the identification of some striped species. In the literature, juveniles have often been mismatched with adults, and various life stages have been incorrectly described as valid species, often with the adult or juvenile form unknown. In the latest review of the family, Smith (1962) failed to correctly associate many of the species with their synonyms, and he described *G. gaterinoides* (a junior synonym of *P. lineatus*). He also presented a figure depicting seven colour phases of *P. orientalis* from 135 to 550mm in length. The second to fourth specimens in the figure (fig. 15 B, C and D) range from 175 to 233mm and clearly illustrate blotched individuals, however our studies indicate that specimens of this size are often, if not usually, striped as in larger specimens. The purpose of this paper is to validate two Linnaean species, both of which have a juvenile phase with horizontal stripes, and to compare meristic values of other similarly striped species of *Plectorhinchus*.

Perca lineata and *P. vittata* are among the 29 species classified in *Perca* by Linnaeus (1758). Both were described with reference to volumes of Museum Adolphi Friderici as having five longitudinal white bands, but no locality details were provided. Cuvier in Cuvier and Valenciennes (1830: 309) was the first to correctly relate *lineata* with haemulid fishes when he placed it in the genus *Diagramma*. He gave the dorsal-ray count for the species as XII, 20, thus resolving the count of XVII, 16 dorsal rays of Linnaeus by noting the small size and poor

condition of the specimen and implying a miscount. Smith (1962: 495) suggested that the difference in dorsal-ray count might be a misprint.

Fernholm & Wheeler (1983: 245) reported on the type specimen, NRM LP 8, 41mm SL, in the Swedish Museum of Natural History, Stockholm. They stated that the labels with the fish represent a continuous record of its history and confirm it as having been part of King Adolf Fredrik's collection. They agreed with Cuvier that Linnaeus probably miscounted the dorsal rays on the small specimen; their corrected count is XIII, 19. They wrote that Linnaeus failed to make reference to the illustration of this fish on plate 31 of volume 1 of Museum Adolphi Friderici, adding, 'Had he done so, much of the uncertainty surrounding the application of the name in later years might have been avoided'.

Fernholm & Wheeler (1983: 246) also found the holotype of *Perca vittata*, NRM LP 11, 162mm SL, and were the first to report it as a species of Pomadasyidae (= Haemulidae), identifying it as *Plectorhinchus* sp. Linnaeus gave the dorsal-ray count as XII, 18 and the anal-ray count as I, 6; these counts were corrected by Fernholm & Wheeler to XII, 20 and III, 7, respectively. They noted that 'Habitat in America' was added to the species account in Linnaeus' 12th edition of Systema Naturae, an error which could well explain the long delay in correctly placing this fish to genus. The genus *Plectorhinchus* is confined to the Indo-Pacific region.

Most of the species of *Plectorhinchus* show dramatic changes in colour pattern with growth, and apparently depending on the environmental



FIG. 1. *Perca lineata* Linnaeus, 1758. Holotype, NRM LP 8 (SL 41mm, TL 46mm).

conditions, the changes can take place at different lengths by fish of the same species from different localities.

We are aware of six species of *Plectorhinchus* that can be striped at the lengths of the two holotypes. To provide unambiguous evidence of the association between the two Linnaean names and these species, we requested photographs of the type specimens, as well as meristic data and observations on colour pattern from the Swedish Natural History Museum. Sven O. Kullander kindly provided the photographs (reproduced here as Figs 1 and 2). He also obtained a radiograph of the type of *Perca vittata*, which enabled us to correct the number of dorsal rays to XII, 18. He counted the outer first-arch gill rakers of *P. lineata* as 9 + 21, and those of *P. vittata* as 10 + 21. He determined that the stripes on the head of *P. vittata* pass straight across the forehead and snout and do not incline downward or break into spots.

We have obtained counts of the dorsal spines and rays, pectoral rays, and gill rakers of available specimens of six striped species of *Plectorhinchus* in the Australian Museum, Sydney (AMS), Bernice P. Bishop Museum, Honolulu (BPBM), California Academy of Sciences, San Francisco (CAS), CSIRO Marine Laboratories, Hobart (CSIRO), Hokkaido University, Hakodate (HUMZ), Miyazaki University, Miyazaki (MUFZ), Natural History

Museum, London (BMNH), Northern Territory Museum, Darwin (NTM), Queensland Museum, Brisbane (QM) and Western Australian Museum, Perth (WAM). From these data (Table 1) and examination of type descriptions and figures and documentation of colour pattern change (Fig. 3), we can confirm the synonymy of Senou & Shimada (1991) that *Plectorhinchus lineatus* is the senior synonym of *Diagramma goldmanni* Bleeker (the large adult with oblique stripes on the back), *D. radju* Bleeker (a large juvenile), *D. haematochir* Bleeker (subadult), and *Gaterin gaterinoides* Smith (large juvenile). Senou & Shimada (figs 7-12) illustrated individuals from 22.5 to about 200mm SL in colour, but not the large adult 'goldmanni' form.

We can confirm that *Plectorhinchus vittatus* is the senior synonym of *P. orientalis* (Bloch), the name used by most recent authors for this species, and as recognised by R.J. McKay as early as 1992 (pers. comm.). We recommend acceptance of *vittatus* over *orientalis* as conditions relating to the current International Code of Zoological Nomenclature (1999), pertaining to the validity of names and principal of priority (Article 23.9: Reversal of precedence) are not met in this instance. R.J. McKay had previously recognised that *P. lineatus* and *P. vittatus* were senior subjective synonyms of *Plectorhinchus goldmanni* (Bleeker) and *P. orientalis* respectively, following an



FIG. 2. *Perca vittata* Linnaeus, 1758. Holotype, NRM LP 11 (SL 162mm, TL 195mm).

investigation of the type specimens (R.J. McKay, pers. comm., 1992). Indeed, following his recommendation, the name *P. vittatus* has been used by authors after 1899 (e.g. Randall & Anderson, 1993; Winterbottom & Anderson, 1997; Randall et al., 1997).

Although the number of dorsal-spines and pectoral-rays of the holotype of *P. vittatus* are not modal for counts of museum specimens presented in Table 1, they are within the range for the species, and the soft dorsal count is modal. More convincing is the total outer first-arch gill-raker count of 31 for the holotype of *P. vittatus* (see Table 1); not only is it modal, but it is also outside the range of the other five striped species. In addition, the pattern of the stripes as shown in Figure 2 and augmented by Kullander provide further confirmation. Note on the horizontally striped phases of the two species in Figures 3 and 4 that a dark stripe passes through the centre of the eye in *P. lineatus* but not *P. vittatus*. The remarkable changes in colour pattern of this species with growth have been illustrated by Smith (1962: fig. 15) and Senou (1991: figs 13-18), as *P. orientalis*. Other synonyms include *Bodian cuvier* Bennett (*Bodian* is an incorrect spelling of *Bodianus*), and *Diagramma sebae* Bleeker.

Plectorhinchus lineatus occurs in the western Pacific from the Ryukyu Islands south to the Great Barrier Reef and east to the Caroline

Islands and New Caledonia. The more wide-ranging *P. vittatus* is known from Samoa to the east coast of Africa (but not the Great Barrier Reef or inshore waters of western and northern Australia or the seas of the Arabian Peninsula).

MATERIAL. (lengths in mm are standard lengths)

Plectorhinchus albovittatus. AMSIA9433, 93.5mm, Fiji; AMSI19346-006, 87mm, Philippines; BPBM5166, 125mm, Viti Levu, Fiji; BPBM26766, 87mm, Jenepono, Sulawesi, Indonesia; BPBM29349, 125mm, Bali, Indonesia; CAS-SU20264, 3: 52-57mm, Apari, northern Luzon, Philippines; CAS uncat., 78mm, Koror, Palau; CAS uncat., 3: 59-95mm, Babelthuap, Palau; CAS-SU27372, 88mm, Palau; QMI7746, 431mm, Magnetic I., Qld; QMI11319, 583mm, off Cairns, Qld; QM120290, 97mm, fish market, S of Denpasar, Bali.

Plectorhinchus gaterinus. BPBM17589, 4: 41-144mm, Mafia I., Tanzania; BPBM18150, 228mm, Dahab, Gulf of Aqaba, Egypt; BPBM18178, 49mm, Gulf of Aqaba; BPBM28035, 2: 79-81mm, Lamu, Kenya; BPBM29464, 6: 94-227mm, Bahrain (Persian Gulf); BPBM33259, 64mm, Tanura, Saudi Arabia (Persian Gulf).

Plectorhinchus lessonii. AMSI17491-030, 139mm, Savo I., Solomon Islands; AMSI150, 105.5mm, Bali; AMSI1324, 175mm, Iran Jaya; AMSI23694-001, 265mm, Queensland, Australia; AMSI17142-018, 234mm, Santo, New Hebrides (Vanuatu); AMSI20774-141, 273mm, off Cape Melville, Qld, Australia; BPBM8886, 87mm, Philippines (aquarium trade); BPBM9473, 3: 205-239mm, Malakal Harbour, Palau; BPBM18666, 174mm, Hou-Pi-Hoo, southern Taiwan; BPBM19175, 285mm, Okinawa, Ryukyu Islands; BPBM20889, 64mm and

TABLE 1. Meristic data for striped *Plectorhinchus* species. Symbols signify counts for holotypes, * = *P. lineatus*, ** = *P. vittatus*.

| | Dorsal Spines | | | Dorsal Rays | | | | | | Pectoral Rays | | |
|------------------------|---------------|------|-----|-------------|------|-----|----|----|----|---------------|-----|----|
| | XII | XIII | XIV | 14 | 18 | 19 | 20 | 21 | 22 | 10 | 14 | 18 |
| <i>P. albovittatus</i> | - | 15 | - | - | 14 | - | - | - | - | - | 14 | 2 |
| <i>P. gaterinus</i> | - | 14 | - | - | 7 | 6 | 2 | - | - | 14 | - | - |
| <i>P. lessonii</i> | 28 | 3 | - | - | 1 | 12 | 18 | - | - | 1 | 30 | 7 |
| <i>P. lineatus</i> | - | 37* | - | - | 4 | 24* | 10 | - | - | 1 | 25* | - |
| <i>P. polytaenia</i> | 16 | 8 | - | - | - | - | 3 | 10 | 11 | 2 | 20 | 1 |
| <i>P. vittatus</i> | 2** | 19 | 1 | 3 | 11** | 8 | - | - | - | - | 4** | 18 |

| | Upper Gill Rakers | | | | | | Lower Gill Rakers | | | | | | | | | | | |
|------------------------|-------------------|----|---|----|-----|-----|-------------------|----|----|----|----|----|----|----|-----|----|----|----|
| | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| <i>P. albovittatus</i> | - | - | - | 5 | 11 | - | - | - | - | - | - | - | 1 | 5 | 10 | - | - | - |
| <i>P. gaterinus</i> | - | - | - | 10 | 5 | - | - | - | - | - | - | 7 | 7 | 1 | - | - | - | - |
| <i>P. lessonii</i> | 3 | 27 | 5 | - | - | - | - | 8 | 23 | 3 | 1 | - | - | - | - | - | - | |
| <i>P. lineatus</i> | - | - | 2 | 22 | 14* | - | - | - | - | - | - | 1 | 9 | 23 | 5* | - | - | |
| <i>P. polytaenia</i> | - | - | 4 | 9 | 10 | 1 | - | - | - | - | - | 2 | 10 | 10 | 2 | - | - | |
| <i>P. vittatus</i> | - | - | - | - | 9 | 9** | 4 | - | - | - | - | - | 4 | 3 | 6** | 6 | 1 | 2 |

| | Total Gill Rakers | | | | | | | | | | | | | | | | |
|------------------------|-------------------|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|
| | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| <i>P. albovittatus</i> | - | - | - | - | - | - | - | - | - | 4 | 4 | 8 | - | - | - | - | - |
| <i>P. gaterinus</i> | - | - | - | - | - | - | - | 5 | 7 | 2 | 1 | - | - | - | - | - | |
| <i>P. lessonii</i> | 2 | 7 | 18 | 6 | 2 | - | - | - | - | - | - | - | - | - | - | - | |
| <i>P. lineatus</i> | - | - | - | - | - | - | 1 | - | 8 | 14 | 13 | 2* | - | - | - | - | |
| <i>P. polytaenia</i> | - | - | - | - | - | - | - | 3 | 8 | 5 | 6 | 2 | - | - | - | - | |
| <i>P. vittatus</i> | - | - | - | - | - | - | - | - | - | 1 | 5 | 3 | 7** | 2 | 2 | 1 | 1 |

BPBM29350, 132mm, Bali, Indonesia; BPBM26672, 48mm, Manado, Sulawesi, Indonesia; BPBM29999, 140mm and BPBM30098, 69mm, Lombok, Indonesia; BPBM38708, 141mm, Ishigaki, Ryukyu Islands; CAS49579, 199mm, Siluag I., Sulu Archipelago, Philippines; CAS51980, 4: 24-64.5mm, Dumaguete, Negros, Philippines; CAS88540, 86mm, Bolinao, Luzon; CAS-SU39054, 130mm, Manila Bay, Luzon; NTMS10663-001, 105mm, Barang-Lompo, Ujung Pandang, Sulawesi, Indonesia; QM uncat., 2: 160-228mm, Qld; QMI11322, 325mm, off Bundaberg, Qld; QMI12006, 294mm, off Cairns, Qld; QMI113205, 307mm, Big Broadhurst Reef, off Cape Bowling Green, Qld; QMI15377, 236mm and QMI15378, 251mm, Flinders Reef, off Cape Moreton, Qld; QMI19093, 300mm, off Cairns, Qld; QMI19147, 346mm, Swain Reefs, Qld; QMI20053, 327mm SL, Keeper Reef, Qld; QMI29832, 323mm, Boulton Reef, Bunker Group, Qld.

Plectorhinchus lineatus. AMSIB149, 130mm, Bali; AMSI8309, 90mm, Malaysia; AMSI9138, 96mm, Hood Bay, Papua New Guinea; AMSI9201, 73mm, same data; AMSI13412, 294mm, same data; AMSI10512, 90.5mm, Mindanao, Zamboanga, Philippines; AMSI13411, 177mm, Port Moresby, Papua New Guinea; AMSI1072, 218mm, same data; AMSI13840, 186mm, Admiralty

Islands; AMSI15360-078, 333mm, Bitu-Ama Reef, N. side, Solomon Islands; BPBM7264, 170mm, Ishigaki, Ryukyu Islands; BPBM22203, 2: 40-64mm, Negros, Philippines; BPBM26653, 108mm, Bunaken, Sulawesi, Indonesia; BPBM30099, 2: 65-77mm and BPBM38709, 43mm, Lombok, Indonesia; CAS7070, 73mm, Mindanao, Philippines; CAS1930, 39mm and CAS53446, 170mm, Siluag I., Sulu Archipelago, Philippines; CAS-SU26961, 179mm, Culion, Philippines; CAS-SU26962, 5: 32-80mm, Dumaguete, Negros, Philippines; CAS-SU62720, 142mm, Zamboanga, Mindanao, Philippines; QMI6749, 495mm, Cape Cleveland, Qld; QMI12909, 177mm, QMI19094, 441mm, QMI19095, 458mm, QMI19096, 417mm and QMI19097, 334mm, off Cairns, Qld.

Plectorhinchus polytaenia. BMNH1859.4.21.226, 120mm and BMNH1859.4.21.222, 167mm, Amboina; BMNH1870.8.31.41, 161mm, Mosil I.; BMNH1880.4.21.47-48, 2: 129-138, no data; BPBM17436, 2: 304-315mm, Kendrew I., Western Australia; BPBM22176, 215mm, Sumilon I., Philippines; BPBM32370, 124mm, Komodo, Indonesia; CAS-SU26968, 2: 137-155mm, Jolo, Philippines; NTMS10590-004, 285mm, New Year I., Arafura Sea; NTMS11289-002, 321mm, White I., Cape Amhem, NT;

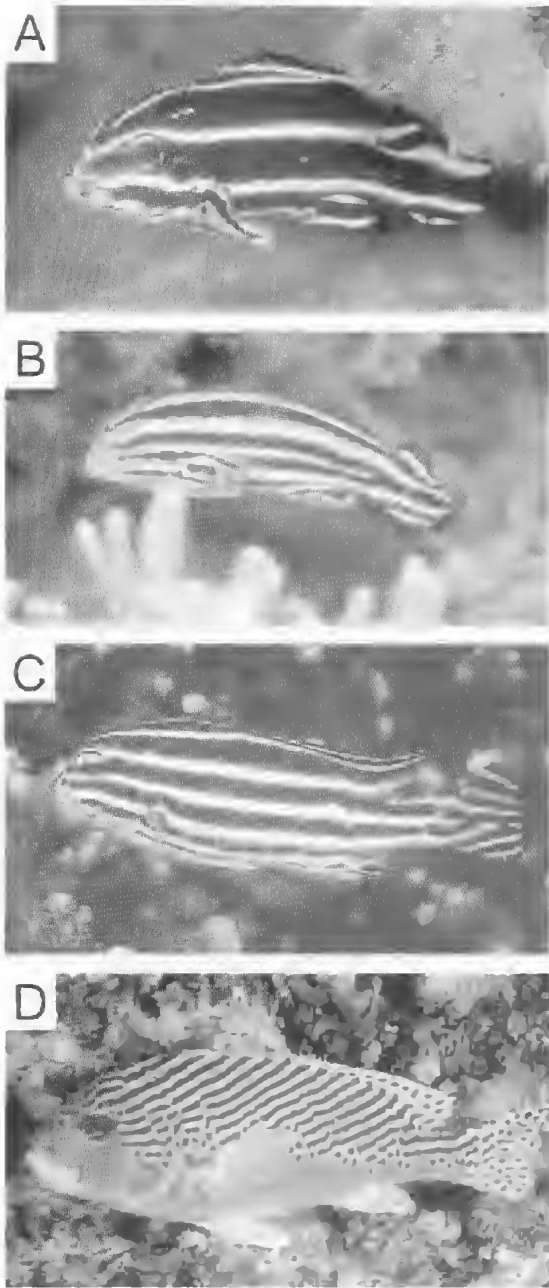


FIG. 3. *Plectorhinchus lineatus*: A, Sanur, Bali, TL 90mm (photo, Takamasa Tonozuka); B, Palau, TL 110mm; C, Tulamben, Bali, TL 180mm (photo, Rudie Kuiter); D, Yonge Reef, Australia, TL 450mm. Total length (TL) given for fishes photographed underwater is an estimate.

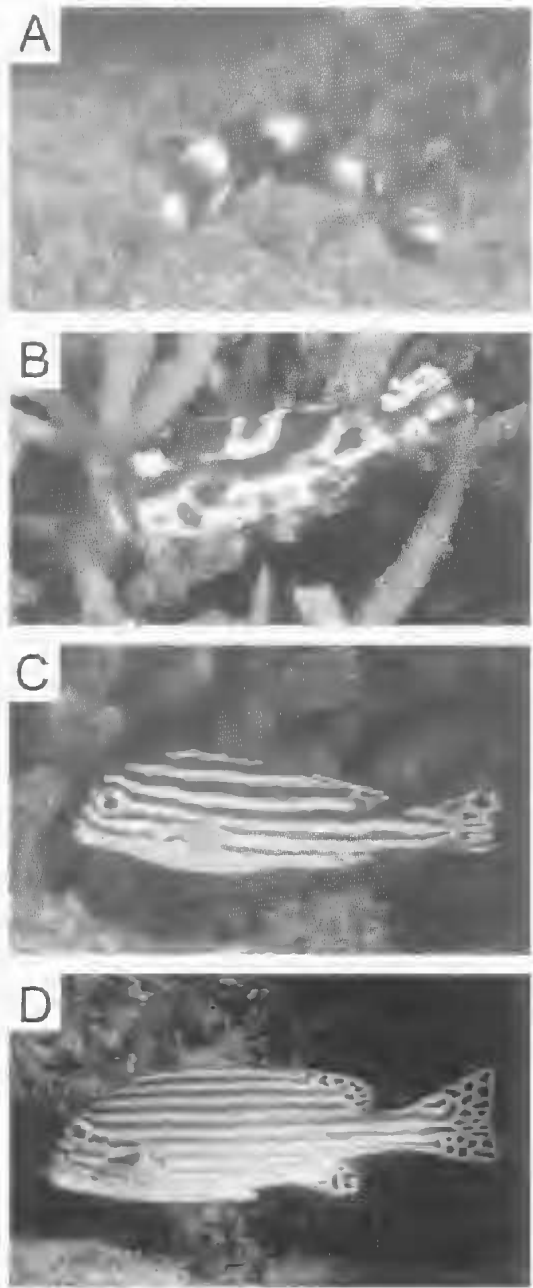


FIG. 4. *Plectorhinchus vittatus*: A, Mahe, Seychelles, TL 50mm; B, Maldives, TL 165mm; C, Sri Lanka, TL 180mm; D, Maldives, TL 300mm. Total length (TL) given for fishes photographed underwater is an estimate.

NTMS10451-011, 270mm, off Table Head, Port Essington, NT; QMI10210, 345mm, Exmouth Gulf, WA.

Plectorhinchus vittatus. AMS 115360-077, 161mm, Malaita, Solomon Islands; AMS 1220, 106mm, Admiralty Islands, Papua New Guinea; AMS 19748, 241mm, Hood Bay, Papua New Guinea; BPBM 4020, 335mm, Guam, Mariana Islands; BPBM 9015, 2: 83-92mm, BPBM 18790, 214mm, and BPBM 27171, 65mm, Sri Lanka; BPBM 11650, 294mm, Fiji; BPBM 13636, 85mm, Madang, Papua New Guinea; BPBM 16061, 153mm, Guadalcanal, Solomon Islands; BPBM 16191, 129mm, Alite Reef, Solomon Islands; BPBM 17624, 166mm, Mafia I., Tanzania; BPBM 21577, 44mm and BPBM 35510, 25mm, La Digue, Seychelles; BPBM 29336, 179mm, Bali, Indonesia; CAS 7462, 97mm, Viti Levu, Fiji; CAS 65609, 96mm, Bagabag I., Madang, Papua New Guinea; CAS 120475, 108mm, Calayan I., Cagayan Prov., Philippines; NTM S13162-004, 220mm, Lelama fish landing, Negombo, Sri Lanka; NTM S13435-022, 83mm, Hibernia Reef, Timor Sea; WAM P20925-001, 356mm, unspecified offshore atolls, WA.

OTHER MATERIAL. (examined by colleagues)

Plectorhinchus lessonii. HUMZ41407, 157mm, Ishigaki, Ryukyu; HUMZ48226, 207mm, Marshall Islands.

Plectorhinchus lineatus. HUMZ69941, 185mm, Naha, Okinawa, Ryukyu Islands; MUF6353, 228mm, MUF6359, 193mm, MUF6360, 240mm, MUF6373, 196mm, MUF6374, 262mm and MUF6375, 347mm, Okinawa, Ryukyu Islands.

Plectorhinchus polytaenia. CSIROCA450, 288mm, N of Eighty Mile Beach, WA; CSIROH4017-01, 250mm, N of Cape Preston, WA; CSIROCA1648, 267mm, NW of Bathurst I., NT; WAMP7377-001, 380mm, Black Ledge, Onslow, WA; WAMP20213-001, 295mm, Dampier Archipelago; WAMP20243-001, 300mm, Delambre I., WA; WAMP22859-001, 240mm, Kendrew I., off Museum Bay; WAMP24556-001, 330mm, Western Australia; WAMP25354-007, 230mm, Monte Bello I., WA.

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